

CLAIMS:

1. A method comprising:
sensing an electrical signal with a first electrode;
5 commencing a timing window; and
recording the electrical signal as an invalid sense when a second electrode fails to
sense the electrical signal in the timing window.
2. The method of claim 1, further comprising:
10 ending the timing window; and
resetting an escape interval when the second electrode senses the electrical signal in
the timing window.
3. The method of claim 2, wherein the second electrode delivers pacing therapy, the
15 method further comprising inhibiting pacing therapy with the second electrode until the
expiration of the reset escape interval.
4. The method of claim 1, wherein the first electrode is a left ventricular electrode and
the second electrode is a right ventricular electrode.
- 20 5. The method of claim 1, wherein the first electrode delivers pacing therapy, the
method further comprising inhibiting pacing therapy with the first electrode in the timing
window.
- 25 6. The method of claim 1, further comprising:
performing a morphological analysis of the electrical signal; and
recording the electrical signal as an invalid sense as a function of the morphological
analysis.
- 30 7. The method of claim 1, further comprising counting the number of invalid senses
during a monitoring period.

8. The method of claim 7, further comprising adjusting therapy as a function of the number of invalid senses during the monitoring period.

5 9. A computer-readable medium comprising instructions for causing a programmable processor to:

sense a electrical signal with a first electrode;

commence a timing window; and

10 record the electrical signal as an invalid sense when a second electrode fails to sense the electrical signal in the timing window.

10. The medium of claim 9, the instructions further causing the programmable processor to:

end the timing window; and

15 reset an escape interval when the second electrode senses the electrical signal in the timing window.

20 11. The medium of claim 10, wherein the second electrode delivers pacing therapy, the instructions further causing the programmable processor to inhibit pacing therapy with the second electrode until the expiration of the reset escape interval.

12. The medium of claim 9, wherein the first electrode is a left ventricular electrode and the second electrode is a right ventricular electrode.

25 13. The medium of claim 9, wherein the first electrode delivers pacing therapy, the instructions further causing the programmable processor to inhibit pacing therapy with the first electrode in the timing window.

30 14. The medium of claim 9, the instructions further causing the programmable processor to:
perform a morphological analysis of the electrical signal; and

record the electrical signal as an invalid sense as a function of the morphological analysis.

5 15. The medium of claim 9, the instructions further causing the programmable processor to count the number of invalid senses during a monitoring period.

16. The medium of claim 15, the instructions further causing the programmable processor to adjust therapy as a function of the number of invalid senses during the monitoring period.

10 17. A method comprising:
sensing an electrical signal with a left ventricular electrode;
commencing a timing window; and
recording the electrical signal as an invalid sense when a right ventricular electrode fails to sense the electrical signal in the timing window.

15 18. The method of claim 17, further comprising:
sensing the electrical signal with the right ventricular electrode in the timing window;
ending the timing window;
resetting an escape interval; and
20 inhibiting pacing with the right ventricular electrode until the expiration of the reset escape interval.

25 19. The method of claim 17, further comprising ending the timing window and delivering a right ventricular pace when a ventricular escape interval expires in the timing window.

20. The method of claim 17, further comprising delivering a left ventricular pace and a right ventricular pace after the timing window expires.

30 21. The method of claim 20, further comprising:
inhibiting the left ventricular pace in the timing window; and
delivering the left ventricular pace immediately after the timing window expires.

22. A system comprising:

a first electrode for placement proximal to a heart;

a second electrode for placement proximal to the heart;

5 a controller that senses an electrical signal with the first electrode, commences a timing window and records the electrical signal as an invalid sense when the controller fails to sense the electrical signal with the second electrode in the timing window.

10 23. The system of claim 22, wherein the controller ends the timing window and resets an escape interval when the controller senses the electrical signal with the second electrode in the timing window.

15 24. The system of claim 22, wherein the controller counts the number of invalid senses during a monitoring period.

25 25. The system of claim 24, wherein the controller adjusts therapy as a function of the number of invalid senses during the monitoring period.

20 26. The system of claim 22, wherein the controller performs a morphological analysis of the electrical signal.

27. The system of claim 22, wherein the first electrode is a left ventricular electrode and the second electrode is a right ventricular electrode.

25 28. The system of claim 27, wherein the controller delivers a right ventricular pace and a left ventricular pace after the timing window expires.

29. The system of claim 22, wherein the controller comprises a microprocessor.

30 30. A method comprising:
in a first monitoring period,

sensing at least one electrical signal with a first electrode,
commencing a timing window having a first duration and
recording the electrical signal as an invalid sense when a second electrode
fails to sense the electrical signal in the timing window having the first duration; and

5 in a second monitoring period,

sensing at least one electrical signal with the first electrode,
commencing a timing window having a second duration and
recording the electrical signal as an invalid sense when a second electrode
fails to sense the electrical signal in the timing window having the second duration.

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31. The method of claim 30, further comprising recording the electrical signal as a valid
sense in the first monitoring period when the second electrode senses the electrical signal in
the timing window having the first duration.

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32. The method of claim 30, further comprising:
incrementing a counter for each electrical signal sensed with the first electrode in the
first monitoring period.

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33. The method of claim 32, further comprising:
resetting the counter;
incrementing the counter for each electrical signal sensed with the first electrode in
the second monitoring period.

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34. The method of claim 30, further comprising selecting a timing window duration as a
function of the invalid senses in the first monitoring period and the second monitoring
period.

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35. A method comprising:
sensing an electrical signal with an electrode disposed proximal to a chamber of a
heart;
performing a morphological analysis on the electrical signal; and

inhibiting pacing when the morphological analysis is consistent with the electrical signal being generated by an intrinsic activity of the chamber.

36. The method of claim 35, wherein morphological analysis comprises at least one of
5 Fourier analysis, wavelet analysis, adaptive filter analysis and morphological template matching.

37. The method of claim 35, further comprising recording the electrical signal as an
invalid sense when the morphological analysis is inconsistent with the electrical signal being
10 generated by an intrinsic activity of the chamber.

38. The method of claim 35, wherein the chamber is the left ventricle.

39. A method comprising:
15 sensing an electrical signal with a first electrode;
commencing a timing window; and
recording the electrical signal as a valid sense when a second electrode senses the
electrical signal in the timing window.

40. The method of claim 39, further comprising recording the electrical signal as an
invalid sense when a second electrode fails to sense the electrical signal in the timing
20 window.

41. The method of claim 39, further comprising ending the timing window and resetting
an escape interval when the second electrode senses the electrical signal in the timing
25 window.

42. The method of claim 39, wherein the first electrode is a left ventricular electrode and
the second electrode is a right ventricular electrode.

43. The method of claim 39, further comprising inhibiting pacing with the first electrode in the timing window.

44. The method of claim 39, further comprising:

5 performing a morphological analysis of the electrical signal; and
recording the electrical signal as a valid sense as a function of the morphological analysis.

45. The method of claim 1, further comprising counting the number of total electrical
10 signals sensed with the first electrode during a monitoring period.

46. A computer-readable medium comprising instructions for causing a programmable processor to:

15 sense an electrical signal with a first electrode;
commence a timing window; and
record the electrical signal as a valid sense when a second electrode senses the electrical signal in the timing window.

47. The medium of claim 46, the instructions further causing the programmable processor
20 to record the electrical signal as an invalid sense when a second electrode fails to sense the electrical signal in the timing window.

48. The medium of claim 46, the instructions further causing the programmable processor
25 to end the timing window and reset an escape interval when the second electrode senses the electrical signal in the timing window.

49. The medium of claim 46, wherein the first electrode is a left ventricular electrode and the second electrode is a right ventricular electrode.

30 50. The medium of claim 46, the instructions further causing the programmable processor to inhibit pacing with the first electrode in the timing window.

51. The medium of claim 46, the instructions further causing the programmable processor to:

perform a morphological analysis of the electrical signal; and

5 record the electrical signal as a valid sense as a function of the morphological analysis.

52. The medium of claim 46, the instructions further causing the programmable processor to count the number of total electrical signals sensed with the first electrode during a
10 monitoring period.

53. A system comprising:

a first sensing means for placement proximal to a heart;

a second sensing means for placement proximal to the heart;

15 a controller means for sensing an electrical signal with the first sensing means, commences a timing window and records the electrical signal as an invalid sense when the controller fails to sense the electrical signal with the second sensing means in the timing window.

20 54. The system of claim 53, wherein the controller means ends the timing window and resets an escape interval when the controller senses the electrical signal with the second sensing means in the timing window.

25 55. The system of claim 53, wherein the controller means counts the number of invalid senses during a monitoring period and adjusts therapy as a function of the number of invalid senses during the monitoring period.

56. The system of claim 53, wherein the controller means performs a morphological analysis of the electrical signal.

57. The system of claim 56, wherein the controller means includes a means for converting the electrical signal to a digital signal.

58. The system of claim 53, wherein the controller means comprises a microprocessor.

59. The system of claim 53, wherein the controller means comprises a sense amplifier means for providing a sensing threshold as a function of the measured amplitude of the electrical signal.

60. A method comprising:
sensing an electrical signal with a left ventricular electrode;
delivering a right ventricular pace immediately after the electrical signal is sensed.

61. The method of claim 60, further comprising delivering a right ventricular pace and, after a negative LV-RV delay, delivering a left ventricular pace.

62. The method of claim 60, wherein the electrical signal is sensed prior to expiration of a pending ventricular escape interval.

63. A method comprising:
sensing an electrical signal with a right ventricular electrode;
delivering a left ventricular pace immediately after the electrical signal is sensed.

64. The method of claim 63, further comprising delivering a left ventricular pace and, after a positive LV-RV delay, delivering a right ventricular pace.

65. The method of claim 63, wherein the electrical signal is sensed prior to expiration of a pending ventricular escape interval.

66. A method comprising:
pacing a first chamber of a heart with a first electrode;

pacing a second chamber of the heart with a second electrode following a delay;
 detecting an activation of the second chamber with the second electrode; and
 pacing the first chamber with the first electrode immediately after detecting the
activation of the second chamber.

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67. The method of claim 66, wherein the first chamber of the heart is the right ventricle
and the second chamber of the heart is the left ventricle.

68. The method of claim 66, wherein the activation of the second chamber is detected
prior to expiration of a pending escape interval.

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